# The Chemical Age

**A Weekly Journal Devoted to Industrial and Engineering Chemistry**

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# Unemployment—Then and Now

IT is only natural to look for parallels between this war and the last, but the quest is becoming rather hopeless. So far is history from repeating itself that the things that chiefly matter are the contrasts which increasingly present themselves in an analysis of the two great conflicts.

The contrasts in the military situation are now the commonplace of conversation. What is not at all generally realised is the astonishing difference between the chief economic factors in 1914 and 1939. There is no more singular case than that of unemployment in Great Britain. At the beginning of the last war there was a widespread fear that millions would be thrown out of work and that a period of acute distress would immediately set in. This was no mere popular fallacy, but was so far shared by the Government that one of its first war-time acts was to authorise the setting up of a committee to collect money from the more fortunate among the public for the relief of unemployment. Mr. Wedgwood Benn, a Minister then in Mr. Asquith's Government, was appointed chairman, and money poured in in generous profusion. At the same time the President of the Local Government Board issued an urgent circular to local authorities inviting them to go ahead at once with any public works they had in contemplation. One such item of capital expenditure, a town hall for a small London borough with seating upholstered with all the sumptuousness of a super cinema of to-day, came in for a good deal of criticism.

It very soon became apparent that these appeals had been based upon a miscalculation. There was actually no more than a temporary dislocation of employment. Volunteers were taken into the armed forces of the Crown a hundred thousand at a time, and vast numbers of operatives were diverted into munition and clothing factories and other new avenues of employment required to supply the needs of an unprecedented war effort. At that stage the hand of officialdom only fell lightly upon commerce and industry and it was not long before Great Britain afforded the spectacle of more jobs than men to tackle them.

The position to-day is very different. Last time it was a case of working up to a maximum effort. This time there was no question of starting from scratch, and the effort at the beginning was already a formidable one. Mr. J. M. Keynes was among the prophets who foresaw a rapid diminution of peace-time unemployment and a consequent problem to be solved by one of his characteristic planning devices. Actually, after nearly three months of war, there is more unemployment. The rise has not been very steep, but it is one of the many unexpected chances to be faced. The reasons for it should be fairly obvious. There has been no recruiting on the Kitchener scale; so far the call from civil life has been only to men of twenty and twenty-one years of age. The very considerable re-armament programme undertaken in the two or three years before the war has resulted in far less of an industrial change-over than had to be improvised in 1914. There has also been the very considerable discouragement to private enterprise caused by the Government learning only too well what it regarded as the lessons of 1914-18. Then it took Whitehall four years to reach the state of regulation and control which was put into force by Parliament in the first week of September. Whereas at this stage in the last war the employing classes were expecting an increase of restrictions, the tendency to-day is quite the other way.

The early follies of over-centralisation have now been exposed, and everything points to a relaxation of public control to the advantage of employers and employees alike. With good sense at the centre and goodwill in the country, there ought to be no great difficulty in mastering the unemployment problem. Such a problem has always been beyond the power of any Government to solve. Private effort has always done it in the past, and if left now to fulfil its natural mission will without doubt do it again.

### TWENTY YEARS AGO

THE future of the British chemical industry at the conclusion of the last war formed the subject of a warning note sounded by THE CHEMICAL AGE in its issue of November 22, 1919.

"Under the stimulation of the fear of starvation or defeat we performed some miracles of rapid organisation," stated THE CHEMICAL AGE. "Now that that stimulus no longer serves as a whip, there is some danger of a partial return to the indolent and, as the war demonstrated, extremely risky policy of taking ready-made supplies from foreign sources, instead of firmly exerting our energies until we are permanently self-dependent for the necessaries of existence and of industry. . . . Nothing could be more fatal to the future of chemical industry than this easy spirit of contentment with present conditions. If we are to maintain the gains of the war period, and to make them a base for permanent advance for the future, we shall need in the next five years of peace as strenuous and sustained an effort as we made during the five years of war."

## CONTENTS


| | |
|---|---|
| *Unemployment—Then and Now* ... ... | 355 |
| *Notes and Comments* ... ... ... ... | 356 |
| *Science Co-ordination—Emulsifying Agents—New MgO Fertiliser—Absent through Illness.* | |
| *Electrochemical Methods of Analysis* ... | 357 |
| *Hydrosulphites and their Derivatives* ... | 359 |
| *Rapid Identification of War Gases* ... ... | 361 |
| *American Kaolins* ... ... ... ... | 361 |
| *Export and Import Regulations* ... ... | 362 |
| *Emergency Addresses* ... ... ... ... | 362 |
| *A Chemist's Bookshelf* ... ... ... ... | 362 |
| *General News from Week to Week* ... ... | 363 |
| *Personal Notes* ... ... ... ... ... | 364 |
| *Wages of Chemical Workers* ... ... ... | 364 |
| *Inventions in the Chemical Industry* ... | 365 |
| *Weekly Prices of British Chemicals* ... ... | 366 |
| *Commercial Intelligence—Stocks and Shares* | 368 |


# NOTES AND COMMENTS

### Science Co-ordination

AT the annual council meeting of the Association of Scientific Workers, held to-day, a memorandum on the national co-ordination of science is being presented. The memorandum justly demonstrates that the scientific resources of this country constitute one of its major assets, and points out that institutions representing scientists will want to play their part in helping with the organisation of science so that it can be of the greatest value to the community, notably in the present state of emergency. At present, however, there is no single body which can co-ordinate the work done in these various institutions, thereby helping them to supplement one another. The Association therefore urges that all scientific organisations should unite in an effort to secure the most efficient utilisation of their resources. To form a basis for discussion a tentative scheme is being put forward, embodying a new Government Department for the Co-ordination of Science governed by a Secretary of State, a Director-General, and an Executive Council. The suggested functions of the Department are briefly outlined, and members of the Association are requested to give the scheme their full consideration. It is hoped to publish in the next issue of THE CHEMICAL AGE some further details regarding this vitally important suggestion, together with a report of the President's address.

### Emulsifying Agents

AN investigation undertaken by J. L. Powers, H. B. Leask and R. S. Warner to determine the constituent or constituents of lanolin responsible for its property of emulusifying water in petrolatum was reported by them to the recent American Pharmaceutical Convention. It was hoped that a suitable water-absorbent base might be developed. Anhydrous lanolin was saponified, and the unsaponifiable portion was resolved into four fractions, cholesterol, a mixture of polycyclic alcohols usually designated as "isocholesterol," a mixture of aliphatic alcohols consisting chiefly of ceryl alcohol, and an amorphous mixture from which no crystalline material could be separated. The water-absorbing power of these various fractions in different concentrations in white petrolatum was determined. Similar data in connection with other polycyclic alcohols such as the amyrins, and aliphatic alcohols such as cetyl alcohol were obtained. Some esters of the various alcohols were prepared and similarly tested. It has been found that no single fraction of the unsaponifiable portion of wool fat is entirely responsible for its emulsifying action upon water. For example, it was determined that whereas a mixture consisting of 4 per cent. cholesterol and 96 per cent. petrolatum will emulsify 1½ times its weight of water, a mixture consisting of 4 per cent. cholesterol, 4 per cent. cholesterol palmitate, and 92 per cent. white petrolatum will emulsify eight times its weight of water.

### New MgO Fertiliser

UP to the present time, water-soluble magnesia has been obtained from magnesium sulphate, in the form of kieserite, etc., containing an equivalent of about 30 per cent. MgO. A new fertiliser material, however, entitled "Seawater Magnesium Oxide," has recently been placed on the market by an American chemical manufacturing company. Manufactured from sea water bittern in California, this material analyses from 92 to 95 per cent. MgO, the balance being largely combined moisture. Used in the fertiliser mixture, this highly activated product is almost completely available in the form of water-soluble magnesia. As "Seawater Magnesium Oxide" contains three times as much MgO as the substances hitherto in use, considerably less bulk is needed and a saving of 30 per cent. in price per unit of MgO is affected. It is claimed that the new material does not deteriorate with age and does not revert to an insoluble form on storage of the finished fertiliser. It is an efficient neutraliser of free acid and makes an excellent conditioner, providing the mixture with the desired physical characteristics.

### Absent through Illness

INTERESTING facts and figures concerning the absence of employees through ill-health are given in the nineteenth annual report of the Industrial Health Research Board (H.M. Stationery Office, 6d.). Quoting figures for an organisation employing 10,000 workers including shop assistants, clerical workers and maintenance staff, the report states that the sickness absence for the men is 2.4 days per year and for the women 4.5 days. An age distribution gave 3.9 days for the group aged 16 to 20, 4.1 days for the group 21 to 25, and 3.9 days for the group over 25. Reviewing past work, the report says that "such clear-cut results as are capable of practical application have been given sufficient prominence to make them readily available to those in industry who are interested; the larger and more enlightened firms are aware of them and have in many instances adopted them. That these results have not been adopted more widely is probably due not so much to ignorance and apathy as to cost in money. The smaller firms may hesitate to take a long view of the benefits—material in output, human in health—which may come from installing a new system of lighting or ventilation when they consider the capital expenditure."

The important article on "New Catalytic Synthesis of Hydrocarbons," begun in our last issue, will be continued in THE CHEMICAL AGE next week.

# ELECTROCHEMICAL METHODS OF ANALYSIS

## A Review of Recent Developments

By
ARTHUR J. LINDSEY, M.Sc., Ph.D. (Lond.), A.R.C.S.

ALTHOUGH analyses based upon electrochemical principles have been employed for a great number of years, such methods do not find a place in many otherwise well-equipped analytical laboratories. This fact is surprising, for it is well established that most electroanalytical procedures are short, precise and capable of rapid repetition. The explanation is probably twofold; firstly, there persists among many analysts a certain distrust of electrical apparatus; and secondly, installation of the necessary equipment has, until recently, been extremely costly. Rapid development in the electrical industries during recent years due to the introduction of the grid system of supply and the mass-production of needed equipment has resulted in such reduction in costs that it is now possible to instal apparatus for electrochemical analysis at a fraction of the former expenditure. Indeed, the chemist interested in electrical matters can construct the majority of the appliances needed by assembling suitable mass-produced components without calling upon the aid of the professional instrument-maker.

In this review it has been thought convenient to discuss in turn the various branches of the subject.

### Quantitative Electrodepositions

The best source of current for analytical electrolysis is still the lead accumulator. However, instead of the extremely bulky, open-topped, glass containers which were formerly employed and which necessitated a special battery room connected to the laboratory by heavy, extensive wiring, it is preferable to use a modern car battery, kept within each analytical bench. This can be charged from the alternating current mains by means of a transformer and metal rectifier, and has the further advantage of easier maintenance.

Within recent years, a reduction in the quantity of platinum necessary in electrodes for rapid depositions has been effected by Sand.[1] The cathode consisted of a gauze cylinder and the anode was built upon a glass frame. Such electrodes are only slightly less efficient than the well-known design described in 1907 [2] and are suitable for both simple determinations and complex separations.

Here it may be noted that many analysts who frequently carry out single determinations do not realise the easy manner in which separations can now be carried out by using their existing apparatus in conjunction with a simple auxiliary electrode and a voltmeter of high resistance and good design.

The method originated by Lassieur[3] and more recently improved [4] has proved to be a valuable and quick analytical procedure for alloys containing a number of metals. One metal after another may be deposited by this method of controlled potential, and tedious filtrations and chemical precipitations are completely avoided. As an example from recent work may be cited the analytical procedure for bearing metals containing copper, antimony, tin and lead, and bronzes containing copper, tin, lead and zinc. In this procedure, developed by Torrance[5], each constituent is determined in turn by electrodeposition from a solution prepared from a single sample weighing from 0.2 to 0.4 gram.

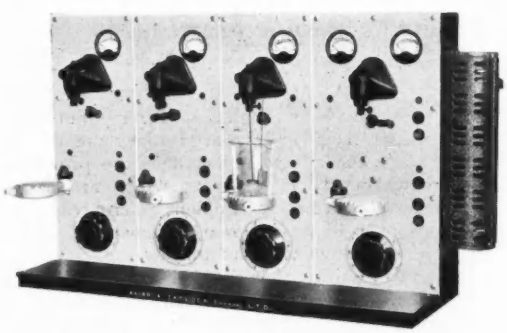

**Fig. 1. Electrolysis stand for industrial use.**

Many instrument makers are producing equipment of good design for such methods as these. A particularly useful electrolysis stand for industrial use is shown in Fig. 1. This has all electrical connections at the back of the panel and almost all moving mechanical parts are also totally enclosed away from fumes. Heating is provided by an electric hot plate. Additional panels may be added by linking busbars behind the panels for electricity supply, and connecting stirrers by rubber belts. Each stirrer has its own gear box and may be put into operation independently.

### Internal Electrolysis for Traces of Metals

The method of internal electrolysis which was first developed by Sand and Collin[3] and which is so valuable for determinations of traces of one metal in the presence of large amounts of a less noble metal has also received attention by recent investigators. Fife[6 7 8 9] has devised procedures for determining traces of cadmium, nickel, copper, and mercury in other metals.

### Microchemical Depositions

Earlier work (up to 1935) on quantitative deposition of metals was designed for single determinations, but until this time no attempt was made to separate metals by potential control. Such separations were accomplished by Sand and the writer[10] and have since been applied to a number of metals. The great advantage of the microchemical technique is that so little material (a few milligrams) is needed and the period required for an analysis is so short. Fig. 2 shows a commercially produced apparatus for this method.

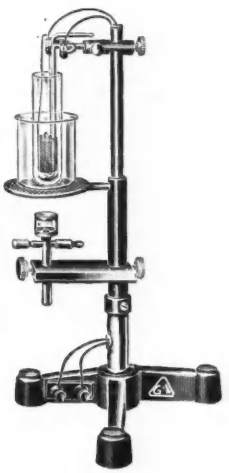

**Fig. 2. Lindsey-Sand apparatus for microchemical analysis.**

### Conductometric Analysis

Although no outstanding electrochemical developments have been made recently in conductometric technique, the method is being more widely employed than formerly owing to the recent improvements in electrical measuring equipment. Valve oscillators, metal and valve rectifiers, amplifiers, measuring bridges and alternating current meters as used in the radio industry may with little or no adaptation be employed for conductometric analysis. Several electrical instrument makers have produced compact equipment, which, supplied from A.C. mains, is particularly useful for conductance measurement and conductometric titrations. Of these the "Mitcham bridge," made by the Mullard Wireless Service Co., Ltd., and shown in Fig. 3, is an example. It is a self-contained bridge and amplifier, the null-point being detected by means of a small cathode ray tube. The instrument is capable of measuring resistances from 0.1 to $10^7$

ohms and capacitances from 10 $\mu\mu$F to 10 $\mu$F, and it is accurate to within 2 per cent.

Conductance water, so necessary in precise measurement and formerly prepared with great difficulty, can be produced continuously at a rate of 1.5 litres per hour by using a two-stage glass still described by I. C. P. Smith.[11]

Conductance measurements may be readily adapted to continuous reading and recording, and for works control of composition of products and effluents some useful instruments have been designed. Recording instruments of this type are often calibrated in terms of the substance to be determined, and such instruments are in regular use in wood pulp, water softening and sewage plants.

## Potentiometric Analysis

The two branches of potentiometric analysis which have shown the greatest progress recently are determinations of hydrogen ion activity and potentiometric titrations.

In *p*H determination, the hydrogen electrode, although persisting as the reference standard and in precision determinations, is being superseded rapidly by the glass electrode standardised on buffer solutions. The change has been brought about, firstly by improvements in the design of glass electrodes, making for robust structures of low electrical resistance, and secondly by the production of thermionic potentiometers capable of measuring small changes of potential operating through high resistances.

**Fig. 3. "Mitcham Bridge" for conductometric analysis.**

Outstanding advances in these directions are the glass electrode due to Johnson[12] and special *p*H meters produced by many firms.[13 14] The latter instrument deserves particular mention on account of the ingenious method of reversing impulses from the test cell so that an impulse amplifier is made to behave as a direct current amplifier. The reader is referred to the original description for full details of this instrument which operates directly from the alternating current mains and incorporates a Weston cell for standardisation.

Potentiometry applied to titrations has progressed mainly in the direction of application to specific analytical problems. The extended use of thermionic valve circuits has much simplified the technique of such titrations, and since polarisation is almost completely absent in these methods greater accuracy is obainable.

From the enormous number of publications made recently in this field a few examples may be quoted. A neat method for the determination of hydrogen peroxide, monopersulphuric acid and dipersulphuric acid in one sample has been described by Bodin.[15] Methods for alloy analysis are abundant, one interesting process describing the potentiometric determination of chromium, iron and molybdenum in a single sample of steel. The methods of differential titration originated by Cox[16] have recently been summarised by Giraut-Erler.[17]

A discussion of potentiometric methods of analysis would not be complete without reference to determinations carried out by means of the dropping mercury cathode. Excellent summaries of the development of the polarograph in this connection are to be found in recent papers by Heyrovsky[18] and Kolthoff.[19] The polarographic method is applicable to traces of metals in the presence of large quantities of other metals (e.g., copper and lead in commercially pure zinc) and to the determination of traces of metallic impurities in organic substances. In addition small amounts of reducible substances such as ketones and nitro compounds may be determined polarographically. Tiny quantities of original material may be employed and so the method has particular use in the investigation of biological fluids. Among the most interesting of these analytical developments are the determination of copper, nickel, iron, lead and manganese in brass by Schwartz[20] and the analysis of magnesium alloys by Semerano.[21]

In conclusion the author wishes to express his thanks to Messrs. Baird and Tatlock (London), Ltd., and Messrs. Griffin and Tatlock, Ltd., for the loan of blocks used in illustrating this summary.

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## THE LAW OF EMPLOYMENT

Employers, executives of employers, and executives of associations of employers or of employed persons will find a valuable guide to the solution of many practical problems in *Statute Law Relating to Employment*, by F. N. Ball, LL.B., a legal book of general utility, containing a comprehensive survey of, and commentary on, these important Statutes, not often collected in one volume. It has just been published (10s. net) by the Thames Bank Publishing Co., Ltd., 29 Cliff Town Road, Southend-on-Sea. The book has been adopted, before publication, by two professional bodies, the Institute of Cost and Works Accountants and the Society of Incorporated Cost Consultants, as an officially recommended text-book.

The book is divided into five main parts. Part I explains the Common Law doctrines relating to employment and deals with the statutes modifying them. Part II, entitled "The Workmen's Compensation Acts, 1925 to 1938," is preceded by an introduction which gives a short account of the main features of the Acts, and contains practical notes on their application, and criticism. Part III, "National Insurance," is subdivided into "National Health Insurance" and "Unemployment Insurance." Much of the value of this part lies in the fact that the complicated structures of phraseology in these statutes have been reduced to simple language. The Factories Act, 1937, and its regulations are dealt with in part IV, while the appendices contain the provisions of certain Acts relating to employment which are not often dealt with in legal text-books. Copious references, explanatory introductions, and logical rearrangement where necessary greatly enhance the value of the volume. For facility of reference, each main part is divided off by a single sheet of extra thickness, coloured pale green and clearly visible when the book is closed. Blank pages for recent cases and legislation are also included; and the whole is clearly printed in "Times" Roman.

# HYDROSULPHITES AND THEIR DERIVATIVES

## Structure, Development and Use in the Textile Industry

By
G. S. RANSHAW

IT is particularly true of the dyeing and finishing end of the textile industry that men are accustomed to working daily with materials whose constitution is a closed book to them; the fact is to be the more regretted, as, in the case of the hydrosulphites and hydrosulphite-formaldehyde compounds, the evolution of many is fascinating, their structure instructive, and their reactions fundamental. Without the hydrosulphites, for instance, dyeing and printing would in all probability be poorer to-day in all the more interesting applications of the vat colours, and in the ability to strip these tenacious dyestuffs in order to correct a shade or utilise faultily dyed fabric.

The hydrosulphites are the salts of hydrosulphurous acid, formula $H_2S_2O_4$, and it was at first thought that the production of sodium hydrosulphite, for instance, was a result of the following typical reaction:—

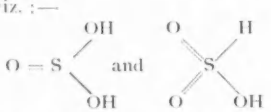
$$Zn + 3NaHSO_3 = Na_2SO_3 + ZnSO_3 + NaHSO_2 + H_2O$$

the sodium hydrosulphite being represented by $NaHSO_2$

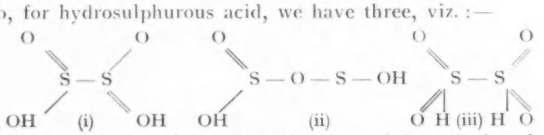
Bernsthen, however, suggested that the formula should be $Na_2S_2O_2.2H_2O$, the reduction of sodium bisulphite with zinc taking the following course:—

$$Zn + 4NaHSO_3 = ZnSO_3 + Na_2SO_3 + Na_2S_2O_4 + 2H_2O$$

To-day it is admitted that sodium hydrosulphite is a salt of a disulphonic acid, according to the following reasoning. Just as for sulphurous acid we have two possible arrangements, viz.:—



so, for hydrosulphurous acid, we have three, viz.:—



and as in hydrosulphurous acid the sulphur, it has been shown, must be joined directly to hydrogen, formula (iii), viz., the disulphonic acid, must be the one from which the hydrosulphites are derived.

### Basis of Industrial Process

The industrial process for the manufacture of sodium hydrosulphite is based on the reduction of the bisulphite with zinc, the reaction being carried out in practice by reacting the zinc with sodium bisulphite in presence of sulphurous acid. The formula for the reaction is as follows:—

$$2NaHSO_3 + H_2SO_3 + Zn = ZnSO_3 + Na_2S_2O_4 + 2H_2O$$

The zinc sulphite and sodium hydrosulphite form a double salt, insoluble in water, so that the product is treated with milk of lime in order to decompose it. In the process the zinc and the sulphurous acid are eliminated. Addition of a solution of common salt now precipitates the hydrosulphite in the form of crystals having the composition $Na_2S_2O_4.2H_2O$.

These crystals are stable only in the very dry state. In solution, sodium hydrosulphite decomposes very easily, atmospheric oxygen causing the formation equally of the bisulphite or bisulphate:—

$$Na_2S_2O_4 + O_2 + H_2O = NaHSO_3 + NaHSO_4$$

or

$$2Na_2S_2O_4 + O_2 + 2H_2O = 4NaHSO_3$$

The stability in air of hydrosulphite obtained by saturating its aqueous salt with common salt is poor, and sufficient stability is obtained only by dehydration. The crystals are brought to a more or less elevated temperature, either in their medium of formation or after filtration, in presence of not of a dehydrating agent such as caustic soda. It is said, however, that one large firm which prepared the anhydrous salts of hydrosulphurous acid by precipitation with common salt and subsequent heating in vacuo in presence of an inert gas or ammonia was unable to apply the resulting compound in certain types of textile printing owing to the extreme ease with which the sodium hydrosulphite decomposed in solution. The stability was, however, improved by using sodium hydrosulphite crushed with glycerine and caustic soda, the early products *Eradite B* and *Rongalite B* being based on this formula.

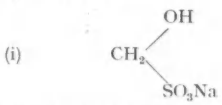
### Combination with Formaldehyde

The two characteristics required of hydrosulphites in textile work are reducing power and stability in solution. A great step forward, especially in the latter direction, was made by the discovery of the combination of sodium hydrosulphite with formaldehyde. It dates back to 1902 and is due to several chemists working independently. Kurtz, for instance, recommended the addition of formaldehyde to a printing paste containing the solid hydrosulphite, and the resulting combination being stable, it was used to produce discharge styles with paranitraniline red. Independently, Zundel remarked that a combination of marked stability was obtained by treating the hydrosulphite with formaldehyde.

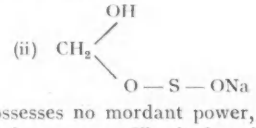
However, in 1900, the Farbewerke de Hoechst had already pointed out the improvement in the stability of printing mediums produced with bisulphite and powdered zinc when formaldehyde was added; whilst even earlier Pellizza and Zuber recorded the idea of producing the zinc formaldehyde hydrosulphite by adding formaldehyde to a paste consisting of powdered zinc and bisulphite. Commercial development of the Kurtz process resulted in the well-known product *Hydralite A*, whilst that of Zundel resulted in the *Hydrosulfites NF, NFW* and *NFX* of the Farbewerke de Hoechst.

### Constitution of the Commercial Products

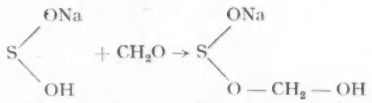
As regards the constitution of these compounds, it has been shown that when formaldehyde acts on sodium hydrosulphite an equimolecular mixture of two bodies is formed. The first is sodium formaldehyde bisulphite, which is a salt of oxymethanesulphonic acid:—



The second is sodium formaldehyde sulphoxylate, a salt of oxymethanesulphinic acid:—

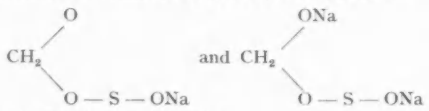


The first possesses no mordant power, but the second is a powerful reducing agent. The hydrosulphurous acid, being a mixed anhydride of sulphurous and sulphoxylic acid, a satisfactory explanation is given of the formation of the oxymethanesulphonic and oxymethanesulphinic acids. With formaldehyde the sodium sulphoxylate gives sodium sulphoxylate formaldehyde.

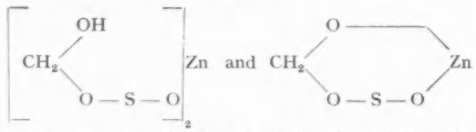


The oxymethanesulphonic acid is monobasic, but the oxy-

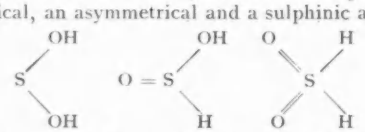
methanesulphinic acid is dibasic and therefore gives two series of salts of which those of zinc are known :—



the zinc salts having the formulæ :—

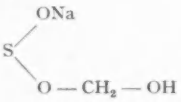


Three structures can be imagined for the sulphoxylic acid, a symmetrical, an asymmetrical and a sulphinic acid form :—

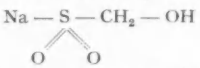


The symmetrical structure does not seem to fit the case of the aldehydic compounds. Of the other two, if the sulphoxylic acid has the sulphinic acid structure it ought to be able to form, by oxidation, the sulphonic acid. It has been shown, however, that by reacting with iodine the sulphonic group is never formed, but the sulphuric acid instead. However, working with permanganate at 0 deg. C. in presence of magnesium chloride it has been possible to obtain oxymethanesulphonic acid. To-day, there are two interpretations of the constitution of aldehyde-sulphoxylic compounds.

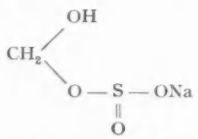
The first derives from the symmetrical form by esterification and gives :—



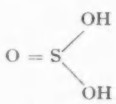
The second, derived from the sulphinic acid form gives :—



With the bisulphite the formaldehyde gives a sulphurous ester, of formula :—

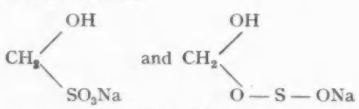


deriving from the sulphurous acid with the symmetrical formula :—



The conception of a sulphurous ester, therefore, is the one generally adopted to-day for the combination of bisulphite with aldehydes.

The commercial development of these compounds have been carefully traced. The first products which were sold were equimolecular mixtures of



and included *Hydrosulfite NF*, *Hydralite A* and *Rongalite C*. The proprietary compounds were prepared either by adding formaldehyde to sodium hydrosulphite or by reduction in acid medium of the aldehyde bisulphite compound, using powdered zinc. The sodium formaldehyde hydrosulphite is transformed in aqueous solution into sodium formaldehyde bisulphite and formaldehyde sulphoxylate.

It was the B.A.S.F. which first succeeded in making the sodium formaldehyde sulphoxylate in the almost pure state, and in 1905 issued *Eradite C* and later *Rongalite C*.

The formaldehyde sulphoxylate was separated from the bisulphite compound by fractional crystallisation in water and dilute alcohol. According to a later patent sodium formaldehyde sulphoxylate can be obtained by treating sodium hydrosulphite with formaldehyde in presence of caustic soda.

$$Na_2S_2O_4 + CH_2O + NaOH = NaHSO_4 : CH_2O + Na_2SO_3$$

One process used at present industrially consists in forming the zinc formaldehyde hydrosulphite, starting from zinc dust in aqueous suspension, sulphurous anhydride and formaldehyde at 80 deg. C. After reactions a small quantity of zinc is added : then, by double decomposition with soda, a sodium salt is formed. Filtration and evaporation in vacuo follow. It may be mentioned in passing that the well-known *Formosul* of Brotherton and Co., Ltd., is probably the pure sodium salt of oxymethanesulphonic acid, whilst their *Zinc Formosul* is the secondary form of zinc formaldehyde sulphoxylate.

## Textile Applications

Turning, finally, to the uses of these compounds in the textile trade we find them used wherever vat colours are to be applied in dyeing or printing, and where difficult colours are to be stripped from dyed or printed fabrics. The vat colours are ketonic derivatives insoluble in water, acids and alkalis, but which, under the action of reducing agents such as hydrosulphite in alkaline media, are transformed into leuco-compounds, soluble in alkalis. In this reduced, and consequently soluble state, the dyes are absorbed by the fabric as are the substantive colours. By reduction the colour is " fixed," fixation in practice being accomplished by steaming. The dye is only partially reduced in the " colour," the transformation into the leuco-derivative, as well as solubilisation and adsorption of the latter on the fibre, only being completed during steaming. The formation of the original colour by oxidation can occur in a subsequent bath containing an oxidising agent such as perborate or bichromate.

Thus, the action of colours with regard to these powerful reducing agents can be classed as (a) action in which the colour is completely destroyed by reduction and of which the residues can easily be eliminated by washing, and (b) action which gives reduction products that can easily be reoxidised in the air to re-form the original colouring matter. (Certain of these reduction products can be eliminated before reoxidation, thanks to their solubility in alkaline media, giving the possibility of stripping indigo, vat colours, etc.).

Class 1 comprises the azoics dyed directly on vegetable fibres; stilbene colours, and acid azoics for wool; mordant colours and insoluble azoics (naphthol base). Class 2 comprises indigo, indigoid and anthraquinone dyes, thiazine dyes, triphenylmethane and the gallocyanines.

## METHANE FROM DISMANTLED COLLIERY

THE FAMOUS Cymmer Colliery at Porth, Glam., from which coal was raised for over a hundred years, recently ceased work. The immense quantity of plant which it contains is to be dismantled by George Cohen, Sons and Company, Ltd., machinery merchants and engineers, of London and Swansea, who have already brought 600 tons of machinery to the surface. In this colliery, about fifty years ago, while boring in this shaft for piping supports, the men struck a " gas blower," a pocket of free gas. It was obviously dangerous to allow such gas to escape into the shaft, so a two-inch pipe line was installed to conduct it to the surface. Here it has been burning ever since without being extinguished. A measurement was taken of the " blow " and it was found that approximately 650 feet per hour were being emitted. The gas is chiefly methane, and arrangements have now been made to " bottle " it in steel cylinders at about 800 lb. per square inch pressure for scientific and industrial use.

# Rapid Identification of War Gases

## Food Contamination Tests

IN the current issue of *The Analyst* (*64*, 764, p. 807), Dr. H. E. Cox describes the tests available for the identification of small quantities of the war gases, especially when examining foodstuffs for contamination. He points out that although the gases most likely to be encountered are mustard gas and the organic arsenicals such as lewisite or the arsenical dusts, mixtures may occur, and it is therefore necessary to be prepared to identify a wider range of poisonous gases. Methods for the identification of twenty-one different types of gas are given in detail, and in order to identify these gases most rapidly, a convenient summary of group reactions which may be applied is appended, under five heads as follows:—

### Group Reactions

A.—The following gases or vapours give rise to a halogen acid on contact with water, and so may be detected with an indicator, such as methyl red:—Chlorine; phosgene; diphosgene; benzyl or xylyl bromide (slowly); diphenylchloroarsine; diphenylaminechloroarsine (slowly); methyl and ethyldichloroarsine; chlorovinylarsine (lewisite); dichlorodiethyl sulphide (mustard gas); methyl and ethyl chlorosulphonate; methyl chloro-formate (with hot water).

B.—The following, which do not quickly form an acid with water, are rapidly decomposed by alcoholic potassium hydroxide, giving an alkali halide: Ethyl bromoacetate; ethyl iodoacetate; bromobenzyl cyanide; bromoacetone; chloro- and bromoacetophenone; phenylcarbylamine chloride; chloropicrin (reacts only slowly); diphenylaminechloroarsine.

C.—The following give hydrogen cyanide on hydrolysis with water, and may be detected by the Prussian blue reaction: Hydrogen cyanide (possibly mixed with stannic salts); cyanogen chloride (slowly hydrolysed in water, quickly by alkali); diphenylcyanoarsine; diphenylaminecyanoarsine.

D.—The following will give an arsenic reaction when absorbed in alkaline permanganate solution: Diphenylchloroarsine; diphenylcyanoarsine; diphenylaminechlorarsine; diphenylaminecyanoarsine; chlorovinylarsine; ethyldichloroarsine.

E.—The following will give colours with concentrated sulphuric acid:—Diphenylaminechloroarsine (red, cold); bromobenzylcyanide (red, warm).

Consideration of the known types of gas, such as those dealt with above, indicates that the question of whether or not certain food is poisonous when taken internally will in practice usually resolve itself into the determination of the cyanide or arsenic content, and that for the purpose of assessing the harmfulness or otherwise the quantities might be considered in terms of hydrogen cyanide and arsenious oxide.

## LUBRICATING OIL CLASSIFIED

The classification of pure mineral lubricating oils, which was issued as B.S. 210 in 1924 by the British Standards Institution, has just been revised, and an attempt has been made in this revision to make clearer the fact that it is a classification intended to be a broad guide to users of lubricating oils, but it is not a specification and does not provide detailed specifications for individual oils. The introduction of new processes of manufacture has made necessary a revision of the classification and a reconsideration of the significance of the tests employed. The classification consists of definitions of five main groups, each subdivided (as commercially practised) into viscosity grades under the names, light, medium and heavy, and for convenience the corresponding units of kinematic viscosity in centistokes are given. All tests except viscosity have been omitted, the reason being indicated in the notes on the significance of tests appended to the foreword. Copies of this revised B.S. (No. 210) may be had from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d. post free.

# American Kaolins

## Extended Use in the Sanitary Field

AN extension of the use of American kaolins in the china tableware bodies, recorded in the U.S. Bureau of Mines Report of Investigation, No. 3473, is the introduction of North Carolina and Georgia kaolins with Tennessee and Kentucky ball clays for manufacturing larger sanitary wares, where the tonnage of clays used is considerably greater than that in fine china. Heretofore, the English ball and china clays have dominated this field largely because of lower transportation costs east of Pittsburgh, the remarkably tough plasticity of certain English ball clays, and the fast-casting, white-firing properties of English china clay. No two clays are alike in all respects, and substitutions or replacements involve disturbing changes for the pottery manufacturer in shrinkages, mould and model sizes, and firing temperatures. Nevertheless, American ball clays, it is said, are slowly replacing the English ball clays west of Pittsburgh, where the cost at the factories is now about 31 per cent. less than for the English clay.

The replacement of English china clay by locally-produced kaolins also has been a difficult problem, but is being pressed more vigorously since the recent improvements in beneficiation and control. The cheapest fractions of Georgia kaolins cost about 20 per cent. less than the English china clay in the Pittsburgh district and about 15 per cent. less in the New Jersey pottery areas, but the more expensive ceramic grades cost 10 per cent. more than the English material in both districts. American kaolins are now produced in many varieties that are claimed to give greater or less plastic and dry strengths, higher and lower temperature of vitrification, and fired colour equal to the English china clay.

During the past year, with the uncertain European situation, a number of sanitary companies have done considerable experimenting in the use of American clays. Results of these studies, though not complete, indicate that a high content of American ball clays, ranging from 25 to 38 per cent., is required for easy casting. A knowledge of the peculiar individual plastic properties of each ball clay is essential. Only one outstanding ball clay has been found to date, but others may possess the practical requirements. The essential characteristics have not been identified accurately. The effect of the 20 to 25 per cent. kaolin content is not as important and does not affect the casting properties as much as the 25 to 38 per cent. ball clay, because the weak plasticity and lower concentration of the kaolin are overshadowed by the stronger plasticity of ball clay. Considerable research is still necessary to determine the important chemical, mineralogical, and physical properties that control the casting action of these American clays.

## CONTROL OF TOLUENE

The Ministry of Supply has made the Control of Toluene (No. 1) Order under Regulation 55 of the Defence Regulations, 1939, under which he takes control of all toluene, toluol, and all other coal tar spirits containing more than 2 per cent. of toluene. None of these may now be acquired or used without a licence from the Ministry of Supply or sold at more than the declared maximum price, and sellers are responsible for seeing that the buyers have such a licence. It is essential that the maximum possible amount of toluene should be available for the manufacture of high explosives and for this reason the use of any crude benzol or any of its products for any purpose must be restricted unless its toluene content has been reduced to 2 per cent. or less. So much toluene is required for national purposes that supplies for ordinary industry will be reduced and substitutes should be used wherever possible. The low gravity benzol obtained from gas works using continuous vertical retorts is included in this order. The Director of Explosives of the Ministry of Supply is responsible for the control of these materials and applications for licences should be addressed to him at the Adelphi, W.C.2.

# Export and Import Regulations

## Burma and Straits Settlements

THE issue of the *Board of Trade Journal* for October 16, contains a list of articles the taking of which by sea out of Burma, without the permission of the Customs Collector, to any destination outside Burma or India is prohibited. The list of goods of importance to the chemical and allied trades is the same as the list of prohibited exports from India, published in THE CHEMICAL AGE on November 11 (p. 330).

The same number of the *Board of Trade Journal* contains a long list of goods the export of which from the Straits Settlements is prohibited except under licence. This latter list includes: Antimony and antimony ores; aluminium and aluminium ores; magnesium; calcium carbide; monazite sands, thorium and cerium compounds; tungsten, vanadium, molybdenum, and their ores and alloys, ferro chrome and ferro silicon; potash salts; graphite and graphite crucibles; abrasives; copper; asbestos; acetone; boron minerals, borax and boric acid; silica sand; mica and micanite; glycerine; sulphur, pyrites, spent oxide and sulphuric acid; rubber, gutta-percha and balata, reclaimed and waste rubber; cobalt; mercury; nickel and nickel ore; manganese ore and alloys; lead ores and compounds; zinc ores and pigments; tanning materials; phosphates, phosphorus and phosphorus compounds; iodine and iodides; bismuth metal and alloys; tin ores and unwrought tin; radium; iridium, osmiridium, iridosmine; platinum and its alloys and compounds; bromine and bromides; gums and resins; charcoal, activated carbon, lamp black, carbon black, acetylene black, gas retort carbon, pitch coke and creosote oils; coal tar and tar distillates generally; synthetic organic dyestuffs; benzol and benzene; toluol and toluene; non-ferrous scrap; iron and steel scrap; palm oil, linseed oil, coconut oil, cotton seed oil, whale oil, oil seed cake and meal; and palladium.

## Marking of Glassware

The Department of National Revenue, Canada (Customs Division) has issued the following regulation concerning the marking of imported goods, in the section relative to surgical and laboratory glassware: ampoules, vials, microscope slides and other articles of glass for the same general purpose, so small in size as to be incapable of being marked on the articles themselves, may be marked on the first or immediate covering or container in which imported.

# Emergency Addresses

The INSTITUTION OF ENGINEERING INSPECTION announces that its registered office is now at 5 Pierrepont Street, Bath.

The temporary address of CHARLES H. CHAMPION AND CO., LTD., is c/o West London Shooting Ground, Northolt, Greenford, Middlesex.

THE PURCHASING OFFICERS' ASSOCIATION has established war-time headquarters at 5 Pierrepont Street, Bath. The secretary, however, has retained a private office in Westminster where he can meet members by appointment.

The temporary war-time London addresses of MESSRS. W. C. HOLMES AND CO., LTD., of Turnbridge, Huddersfield, and 119 Victoria Street, London, S.W.1, are 19 Surbiton Hill Park, Surbiton, Surrey, and "Elex" Dept., 73 Hindes Road, Harrow, Middlesex.

THE ZINC DEVELOPMENT ASSOCIATION is conducting business, during the war, from Lincoln Buildings, 15 Turl Street, Oxford. The Association will be pleased to furnish information concerning regulations governing the use of zinc in war-time, as well as providing the usual technical services.

## CHANGE OF ADDRESS

From December 1, 1939, MESSRS. KELVIN, BOTTOMLEY AND BAIRD, LTD., of 18 Cambridge Street, Glasgow, will be installed in their new works at Hillington, Glasgow.

# A Chemist's Bookshelf

CHEMICAL SPECTROSCOPY, by Wallace R. Brode. New York: John Wiley and Sons, Inc. (London: Chapman and Hall). Pp. xi and 494. 36s.

This book by the Professor of Chemistry in the Ohio State University is intended to supply spectroscopic information to chemical workers, as well as to serve as a textbook for a course in chemical spectroscopy. Those workers who are interested in chemical spectroscopy as a profession might do well to cover the major portion of the volume and certain of the important standard reference books which are listed in the bibliography. Those workers and students who desire a knowledge of chemical spectroscopy as a tool to interpret published data in their field of interest may not find it necessary to cover in detail all the chapters: for such readers certain sub-divisions of the book are suggested. The work deals with atomic and molecular spectra; emission spectra (apparatus); qualitative analysis, spectrum tables and standard samples; quantitative analysis; resonance and chemical structure; absorption spectra; application of absorption spectra data; infra-red and Raman spectra; theory and description of colour; laboratory experiments; theory and practice of photography; and equipment and arrangement of a spectrographic laboratory. A number of tables and charts for use in the interpretation and application of spectroscopic methods have been included.

FLUORESCENCE ANALYSIS IN ULTRA-VIOLET LIGHT, by J. A. Radley and Julius Grant. London: Chapman and Hall. Pp. xvi and 424. 22s. 6d.

This volume represents the third edition of the work to be published since its first appearance in 1933, and testifies to the growing interest in the subject of fluorescence analysis. The book has been brought up to date in all sections and enlarged in size. Part I treats the theory and technique of fluorescence analysis in as simple and brief a manner as possible, due regard being paid to the pitfalls and sources of error which may mislead a beginner; while Part II is more specialised and deals with the applications of the method to a large and varied number of ramifications of pure and applied science. Detailed discussion of recent original papers has been confined to the most important and useful, notably from the analytical viewpoint. By introducing "additional references" after the bibliographies at the end of each chapter, the authors have, however, been able to include references to all papers relevant to the subject, together with a few words indicating the subject-matter in each case. The chapter on textiles and the section on dyestuffs have been completely rewritten, and the latter now appears as a separate chapter. The recent important additions to the range of ultra-violet lamps used for this work are dealt with fully, and a number of new illustrations are also included.

A COLLEGE COURSE OF INORGANIC CHEMISTRY by J. R. Partington. London: Macmillan. Pp. ix and 658. 8s. 6d.

This work is in some ways an abridgment of the author's larger *Text Book of Inorganic Chemistry for University Students* which first appeared in 1921 and is now in a fifth edition. The *Text Book* has been used in school and college courses of Intermediate and Higher Certificate standard, though it goes beyond these requirements. The present book is intended to meet the need of students of this standard in inorganic and physical chemistry. Although the general plan and method of treatment of the *Text Book* have served as a foundation, the text has been very largely rewritten.

YOUNG CHEMISTS AND GREAT DISCOVERIES, by James Kendall. London: G. Bell and Sons. Pp. xvi and 272. 7s. 6d.

Although this book is described as a new popular science book for boys and girls and their parents, the qualified chemist will find much of entertainment and interest within its pages. True, the technical data are elementary, but the descriptions of the early life and struggles of a number of brilliant young chemists and some of their epoch-making experiments make absorbing reading. The book is based on the Royal Institution Christmas Lectures of 1938-39.

# General News——From Week to Week

EMPLOYEES of Courtaulds, Ltd., the rayon manufacturers, are to receive increased wages, following an application by the Transport and General Workers' Union.

INCREASED WAGES have been secured for the employees of James Anderson & Co., gum and starch manufacturers, Glasgow. Workers on the minimum rate are to receive an increase of 1d. an hour and those above the minimum are to be advanced by ½d. an hour. A further increase of ½d. an hour will be given to all workers from January 1, when the position of those on the minimum rate will be discussed again with a view to a greater increase than the ½d.

IT IS ANNOUNCED that the Armour Institute of Technology and the Lewis Institute, both of Chicago, have united to form a new technological centre for their city. The name of the new school is to be the Illinois Institute of Technology, and, like its two component colleges, will serve the community in the field of engineering education. The new college will be one of the largest technological centres in the world, with some 7,000 day and evening students.

AT THE anniversary meeting of the Mineralogical Society on November 9 the following papers were read: (1) Crystallography of aramayoite, by Dr. Harry Berman and Mr. C. W. Wolff; (2) Tektites and silica-glass, by Dr. L. J. Spencer. (3) Some australite structures and their origin, by Mr. George Baker (communicated by Dr. F. L. Stillwell); (4) The Boxhole meteoritic iron, Central Australia, by Dr. C. T. Madigan, with chemical analysis by Dr. A. R. Alderman. Mr. Arthur Russell, the president, was in the chair.

AN EXPLOSION in a Scottish factory last week was the subject of the following statement issued by Imperial Chemical Industries, Ltd.: Imperial Chemical Industries, Ltd., regrets to announce that, as a result of a small explosion which occurred in the detonator department, one worker lost his life and another received injuries from which he has since died. There was no material damage to plant or property. The names of the workers who lost their lives are Walter Maxwell (43), married, and Arthur Findlay (22), single.

WAGES of more than 5,000 workers in the Scottish shale oil industry will be increased following negotiations between the Shale Miners' and Oil Workers' Union and Scottish Oils, Ltd., a subsidiary of the Anglo-Iranian Oil Company. The agreement is to operate as from November 1, and as a result the workers will be granted an immediate wage increase of 8d. per shift for adults and of 4d. per shift for those under 18 years of age. The wages will, furthermore, be increased by 4d. and 2d. per shift respectively for every rise of five points in the cost of living.

TO COPE WITH the increased demand for steel due to war requirements, steel works in Lanarkshire and the West of Scotland may be called upon to remain in operation for seven days a week. At present men engaged in the industry have a 47 hours' working week, which, even with a three-shift system, permits of the works being closed down for almost 24 hours every week-end from Saturday at mid-day. The suggestion now is that furnaces should be ready for the first charge of the week by the early hours of Sunday morning, and to make this possible the kindling and preliminary preparations would have to be undertaken on Saturday.

THE ANNUAL MEETING of the Institute of Vitreous Enamellers will be held at the Midland Hotel, Birmingham, on Thursday, November 30, 1939, at 2 p.m. The main business of the meeting will be the induction of the president and election of officers, the presentation of the annual report for the past year, a discussion on the future activities of the Institute during the national state of war and a review of the Joint Technical Committee publication, "Recommended method of testing acid-resisting enamels." The Council has appointed a special sub-committee to investigate the continuance of the research work. This committee comprises Messrs. W. S. Grainger, W. Todd, J. Gardom and H. H. Aston, and a report will be prepared and presented at the annual meeting for discussion. A meeting of the Southern Section of the Institute will be held at Charing Cross Hotel, Strand, W.C.2, at 7 p.m., on November 22, and of the Midland Section at the Chamber of Commerce, New Street, Birmingham, at 7 p.m., on November 23. The Scottish Section will meet at 6.30 p.m. on November 20 at the Royal Technical College, Glasgow.

ABOUT 2,000 WORKERS employed in the Scottish factories of the British Aluminium Company are to have their pay increased as a result of negotiations completed on November 18 between the firm, the National Union of General and Municipal Workers, and the Transport and General Workers' Union.

THE DIRECTORS of Borax Consolidated, Ltd., decided at a board meeting last Tuesday to pay on December 9 an interim dividend of 3 per cent., less income tax, on the preferred ordinary stock of the company in respect of the financial year ended September 30, 1939.

ACCORDING to the Board of Trade returns for the month ending October 31 imports of chemicals, drugs, dyes and colours into the United Kingdom were valued at £1,031,136, a decrease of £788,800 compared with October, 1938. Exports were valued at £1,097,567, a decrease of £1,247,54. Re-exports were valued at £18,150.

EVIDENCE of greater demand for British goods by foreign buyers is reported by the F.B.I. Trade inquiries received from overseas by the F.B.I. during October are nearly 50 per cent. up on those received during September, and applications from overseas agents anxious to do business for British firms have more than doubled in the same period.

CHINA CLAY shipments from Cornwall during October were again remarkably good, even showing an increase of nearly a thousand tons on October last year. Over eight thousand tons were sent by rail to inland towns, an increase of 3,189 on the corresponding period in 1938. The total tonnage was 71,514 tons against 70,597 tons in October, 1938.

A FIRE broke out last week at the South Yorkshire Chemical Works, Parkgate. The outbreak was in the sulphate of ammonia house. Starting in the saturator plant it quickly spread and seemed likely to become serious. Works firemen, however, tackled the blaze with foam apparatus until the arrival of the Rotherham Fire Brigade, who, using similar methods, quickly had the fire under control. The damage was not extensive.

A MEETING of the Society of Public Analysts will be held on Wednesday, December 6, at the Chemical Society's Rooms, Burlington House, London, S.W.1, at 2.15 p.m. Papers will be read on "The Examination of Lard," and "The Estimation and Examination of 2-Methol-1 : 4-naphthoquinone." The latter paper will be introduced by a brief account of the relationship between 2-Methol-1 : 4-naphthoquinone and Vitamin K.

TO AVOID difficulties due to war conditions, a day session of the Pottery Section of the Ceramic Society, to which interested members of all sections are invited, will be held at the North Staffordshire Technical College, Stoke-on-Trent, on December 11. Sessions will be held at 10.45 a.m.-12.30 p.m., and 2.15-4.30 p.m. In the afternoon, papers on Pug Mills and Pugging, by Mr. A. Jones, and on Vitreous Sanitary Ware, by Dr. Felix Singer, will be followed by discussions.

## Foreign News

ACCORDING to statements in the local Press, the Spanish Government is contemplating the nationalisation of the nitrogen production industry.

THE SIMLA OFFICE of the Director of Contracts, India, was closed on October 7. The office is now at New Delhi (telegraphic address: "Concon," New Delhi).

THE MINING of manganese ore has recently been started at the Marsyat mine, 55 miles from Serov in the Urals. The local deposit and another deposit in the Ivdel district, where a mine is to be put into operation in 1940, are expected to cover the manganese requirements of the Urals iron and steel industry, and thus to obviate the need of carrying manganese from the Caucasus and the Ukraine.

THE JAPANESE Electrolytic Soda Association has been considering what measures to take as regards the anticipated stoppage of imports of industrial salt from the countries along the Mediterranean Sea, and it has been suggested that salt should be purchased instead from America, Australia, Thailand, etc. It is doubtful, however, whether the Japanese Government would give permission for the import of industrial salt from these countries, since to do so would be contrary to the Government's low price policy.

# Personal Notes

MR. RICHARD BREERTON, a director of Redfern's Rubber Works, Ltd., of Hyde, has been installed Mayor of Hyde.

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MR. G. V. CALEY, B.Sc., director and manager of Matthews and Wilson, Ltd., S.E.1, is resigning to take up an appointment with May and Baker, Ltd., Dagenham.

* * * *

SIR JOHN DONALD POLLOCK, chairman and managing director of Metal Industries, Ltd., and a director of British Oxygen, Ltd., was recently elected Rector of Edinburgh University.

## OBITUARY

MR. CHRISTOPHER GREENHALGH, of Regent Road, Birkdale, chairman of the Manchester Chemical Company, died recently, aged 81. He had been connected with the company for over fifty years.

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DR. HENRY CHARLES BROWN, of King's Lynn, managing director of the West Norfolk Farmers' Manure and Chemical Company, South Lynn, died recently, aged 77. Dr. Brown had served for two years as president of the Fertiliser Manufacturers' Association, was a Fellow of the Institute of Chemists and a United Kingdom representative of the International Superphosphates Association.

* * * *

DR. A. P. BEDDARD, former demonstrator in physiology and morbid anatomy and lecturer in medicine at Guy's Hospital, died recently. In 1928 he was appointed chairman of the Pharmacopœia Commission and was largely responsible for the policy of developing the Pharmacopœia as a book of standards, while still retaining in it those features which are necessary to the maintenance of its position as an authoritative guide to the medical profession in the selection and use of drugs. His publications included "Recent Advances in Physiology and Biochemistry."

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MR. JOHN T. BYRNE, former chairman of Goodlass, Wall and Co., Ltd., has left gross estate of £42,861 (net personalty, £40,415).

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MR. W. H. HIGGIN, retired chemical manufacturer, Llanstephan, has left estate valued at £33,498 (net personalty, £24,777).

## THE ADVANCEMENT OF SCIENCE

One of the new measures decided upon by the British Association at its meeting at Cambridge last year was the publication of the annual report of the Association in quarterly parts, under the title of *The Advancement of Science*, to take the place of the annual volumes which have been published by the Association without intermission from 1831 to 1938. In welcoming the first issue, published by the British Association at Burlington House, London, W.1, priced at 5s. and dated October, 1939, it is to be hoped that its appearance at such an unpromising time will not adversely affect the fortune of future issues. In normal circumstances, the prospects of success would have appeared favourable; for, according to the introduction, the publication "is intended in the future to make a wider appeal to lay readers of scientific matter than an annual volume could possibly make." This is a praiseworthy aim, and it remains to be seen to what extent it can be realised in war conditions. Apart from the reporting of the annual meetings, quarterly publication has been adopted with the intention of combating the belief, hitherto widely prevalent through the lack of an effective channel of communication, that the Association, after one such meeting, lapses into a coma until it is time to awaken itself for the next.

# Wages of Chemical Workers

## Increases Demanded by Union Members

THE National Executive Council of the Chemical Workeers Union, at its monthly meeting last week-end, gave attention to problems arising out of the recent large expansion of union membership. Consideration was given to resolutions from branches in the heavy chemical, artificial silk, patent medicines, drug and fine chemical, soap and toilet preparations, and patent foods industrial groups; also in War Department ordnance factories. These resolutions urged the executive to make applications for increased wages to meet the difficulties created by the increased cost of living arising from war conditions: The Union executive decided to instruct its officers to take the earliest possible steps to apply to all firms employing Union members for an all-round increase of existing wages, amounting to 15 per cent.

### War Department Wages

The existing wages and conditions operative in War Department ordnance factories, research stations and experimental stations are based mainly on engineering and allied trades conditions, against which the Union has raised objections for many years. In the Union's opinion, having in mind the close relation of the work performed with chemical industry practices, it has claimed that wages and conditions in these factories, etc., should be based upon chemical industry wages and conditions agreed from time to time between employers and trade unions. In pursuance to the above decisions, the Union executive has instructed Union officers to approach the Committee of Supply (War Department) again, and to submit the following schedule:—

*Males, 21 years and over.*

Day work (unclassified duties), 57s. per week.
Day work (process workers), 64s. per week.
Night shift duties (all grades), time and a quarter above grade rate.
Shift work duties (all grades), 2d. per hour above grade rate.
Charge hands, 2d. per hour above grade rate.
Agreed risk duties, 1d. per hour above grade rates.
Overtime rates: Monday to Saturday, time and a half; Sundays and statutory holidays, double time.

*Females, 21 years and over.*

Day workers (unclassified duties), 36s. per week.
Day workers (semi-skilled duties), 1d. per hour above grade rates.
Shift workers, 1d. per hour above grade rates.
Night shift (if introduced), time and a quarter.
Charge hands, 1d. per hour above grade rates.
Agreed risk duties and overtime rates as for male workers.

## INSTITUTE OF FUEL

The following London meetings of the Institute of Fuel have been arranged to take place at the apartments of the Geological Society of London, Burlington House, Piccadilly, W.1:—At 2.15 p.m., on Thurs., November 30, a paper will be presented by Mr. J. W. Reber entitled "A simplified method for estimating the thermal efficiency of steam boilers," and on Fri., December 15, a paper will be presented by Mr. J. Ivon Graham and Dr. D. G. Skinner entitled "Improvement in calorific value of town's gas or coke oven gas with special reference to utilisation as a fuel for motor vehicles."

### Invitation Meeting

An invitation has been received from the Institution of Automobile Engineers to all members of the Institute of Fuel to attend a special general meeting on the evening of Tues., December 12, at the Institution of Electrical Engineers, Victoria Embankment, W.C.2, at 6 p.m., when Dr. J. S. Clarke, of the City of Birmingham Gas Department, will read a paper entitled "The use of gas as a fuel for motor vehicles."

# Inventions in the Chemical Industry

**The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.**

## Applications for Patents

MANUFACTURE OF LUMINOUS PAINT, ETC.—T. Hamilton-Adams. 29016.

MANUFACTURE AND USE OF ARTIFICIAL RESINS.—Albert Products, Ltd. (Germany, Oct. 31, '38.) 28970.

SYNTHETIC FILAMENTS FIBRES and articles made therefrom.—Carbide and Carbon Chemicals Corporation. (Aug. 27, '38.) (United States, Sept. 15, '37.) 28811.

PRODUCTION OF ZEIN.—Corn Products Refining Co. (United States, Nov. 14, '38.) 28850. (Dec. 22, '38.) 28876.

DYEING OF ARTIFICIAL FIBRES.—Courtaulds, Ltd., C. C. Wilcock, and C. P. Tattersfield. 28947.

MANUFACTURE OF CELLULOSE.—H. Dreyfus. 28900.

SIZING OF TEXTILE MATERIALS.—E. I. du Pont de Nemours and Co. (United States, Oct. 29, '38.) 28965.

MANUFACTURE OF REINFORCED RUBBER STRUCTURES.—E. I. du Pont de Nemours and Co. (United States, Nov. 1, '38.) 29163.

PROCESS AND APPARATUS for the production of artificial structures.—E. I. du Pont de Nemours and Co. (United States, Nov. 1, '38.) 29164.

MANUFACTURE OF SYNTHETIC POLYMERIC STRUCTURES.—E. I. du Pont de Nemours and Co. (United States, Nov. 1, '38.) 29165.

MANUFACTURE OF COLOURED FILAMENTS, YARNS, ETC.—E. I. du Pont de Nemours and Co. (United States, Nov. 1, '38.) 29166.

POLYMERISATION OF ETHYLENE.—E. I. du Pont de Nemours and Co. (United States, Nov. 1, '38.) 29167.

SUCTION TYPE GAS PRODUCERS.—A. W. Gibson and A. E. Mott. 28731.

PRODUCTION OF COMPOSITE REFRACTORY ARTICLES.—Hartford-Empire Co. (United States, Sept. 7.) 28875.

GAS PRODUCERS.—C. W. Heathcote. 29144.

CELLULOSE ACETATE PLASTICS.—Hercules Powder Co. (United States, Dec. 24, '38.) 28787.

PROCESS OF TREATING finely divided calcium carbonate material. Holly Sugar Corporation. (United States, Nov. 5, '38.) 29179.

MEANS FOR MIXING HYDROCARBON FUEL with air for use in internal-combustion engines.—T. Hulme. 28717.

MANUFACTURE OF ORGANIC COMPOUNDS containing chlorine.—A. D. Jones and Imperial Chemical Industries, Ltd. 28728.

PROCESS AND CATALYST for the catalytic conversion of hydrocarbons.—A. L. Mond (Universal Oil Products Co.). 28868.

PROCESSES OF DYEING FILAMENTS, hair and textile materials.—P. Mora. (Italy, Aug. 9.) 28776.

METHOD OF CHEMICAL HEATING.—H. D. Murray. 28721

PURIFYING MEANS for gas-producing apparatus.—J. R. Neil. 29184.

PROCESSES FOR THE PURIFICATION of hydrocarbon oils.—Refiners, Ltd., and T. Scott. 29082.

PROCESS FOR THE MANUFACTURE of cellular rubber having fluid-tight cells.—Soc. Franco-Belge du Caoutchouc "Mousse." (France, Nov. 14, '38.) 28993. (France, Dec. 6, '38.) 28994.

OXIDATION OF PROPENYL BENZENE DERIVATIVES.—Stafford, Allen, and Sons, Ltd., and T. F. West. 28810.

MANUFACTURE OF POLYMER SUBSTANCE and fabric.—Standard Oil Development Co. (United States, Dec. 30, '38.) 28767.

MANUFACTURE OF DETERGENT AIDS and wetting agents.—Standard Oil Development Co. (United States, Dec. 31, '38.) 28878.

TREATMENT OF OLEFINES with mineral acids.—Standard Oil Development Co. (United States, Dec. 31, '38.) 28888.

PRODUCER-GAS PURIFIER.—A. Taub, D. B. Browne, L. W. Budds, and D. B. Foster.—29043.

MANUFACTURE OF SYNTHETIC CONDENSATION or resinous products. Tootal Broadhurst Lee Co., Ltd., and F. C. Wood. 28741.

MANUFACTURE OF AGENTS having detergent, wetting, foaming, dispersing and emulsifying properties.—J. P. A. Vallernaud. (France, Nov. 2, '38.) 29180.

GAS PRODUCERS.—Vauxhall Motors, Ltd., and D. B. Foster. 29044.

DRY POWDER VITAMIN PRODUCT.—Vitamol Inc. (United States, Nov. 5, '38.) 28847.

RECOVERY AND PRODUCTION OF CELLULOSE.—J. R. Wade. 28939.

MANUFACTURE OF SOLID IODINE PREPARATIONS.—Ward, Blenkinsop and Co., Ltd. 28971.

MEANS FOR SUPPLYING PRODUCER-GAS to internal-combustion engines.—A. J. Watts. 29146.

GAS PRODUCERS.—C. Whitfield. 28802.

PURIFICATION OF AROMATIC HYDROCARBON.—Woodall-Duckham (1920), Ltd., H. M. Spiers and H. K. Suttle. 28710

ADHESIVES.—British Industrial Plastics, Ltd., and A. Brookes. 29513.

COMPOUNDS OF RUBBER AND WAX, ETC.—British Insulated Cables, Ltd., H. B. Chapman and W. Evans. 29369.

EXTRUSION OF THERMOPLASTIC MATERIALS.—E. I. du Pont de Nemours and Co. (United States, Nov. 5, '38.) 29489. (United States, Dec. 10, '38.) 29490.

STABILISED VINYL RESINS.—Carbide and Carbon Chemicals Corporation. (United States, Dec. 13, '38.) 29641.

PROCESS FOR PRODUCING regenerated cellulose pellicles.—Cellulose Holdings, Ltd. (United States, Nov. 7, '38.) 29504

PLANT AND MECHANISM for the manufacture of fertilisers.—J. A. Coombs. (Nov. 24, '38.) 29535.

LIQUID ANTI-FREEZING PREPARATION or compound.—County Chemical Co., Ltd., and L. G. Hambreks. 29263.

PROCESS FOR BRIQUETTING SMALL CARBON MATERIALS with the aid of sugar-containing substances.—A. Futo. 29237.

PYROPHORIC LIGHTERS.—E. Gelles. 29261.

METHOD OF REINFORCING moulded plastic materials by metallic coatings.—G. H. Gregory and G. H. Gregory and Co. (Plastics), Ltd. 29595.

MOULDING COMPOSITIONS.—Hercules Powder Co. (United States, Dec. 24, '38.) 29508.

## Complete Specifications Open to Public Inspection

PROCESS FOR TREATING MINERAL OILS with solvents.—Standard Oil Development Co. April 6, 1938. 36154/38.

PROCESS AND ARRANGEMENT for regulating the operation of a gas producer.—Soc. d'Eclairage, Chauffage, and Force Motrice. April 6, 1938. 8233/39.

TEXTILE-MARKING COMPOSITIONS, and textile fabrics bearing such markings.—Interchemical Corporation. April 7, 1938. 9519/39.

PROCESS FOR TREATING CLAYS.—Wisconsin Alumni Research Foundation. April 6, 1938. 10029/39.

METHOD OF MANUFACTURING calcium sulphide or barium sulphide, and products obtained through this method.—C. Leroy, J. Bertrand, and Soc. Anon. de Materiel de Construction. April 8, 1938. 10485/39.

PRODUCTION OF ALCOHOLS from olefines.—E. I. du Pont de Nemours and Co. April 5, 1938. 10535/39.

MANUFACTURE OF THIOLACTAMS.—Imperial Chemical Industries, Ltd. April 4, 1938. 10536/39.

RETORTS OR OVENS for distilling or carbonising fuels and the like.—L. Cacciopoli. April 6, 1938. 10548/39.

MANUFACTURE OF CHROMABLE DYESTUFFS of the triarylmethane series.—I. G. Farbenindustrie. April 9, 1938. 10762/39.

SAPONIFICATION OF TEXTILE MATERIALS containing an organic ester of cellulose.—British Celanese, Ltd. April 6, 1938. 10764/39.

## Specifications Accepted with Date of Application

MANUFACTURE OF DERIVATIVES OF COERULEIN.—Durand and Huguenin A.-G. April 21, 1937. 513,862.

MANUFACTURE OF VAT DYESTUFFS of the anthraquinone series.—A. Carpmael (I. G. Farbenindustrie). April 21, 1938. 513,866.

HYDROLYTIC PRECIPITATION of titanium compounds and the manufacture of titanium pigments.—Titanges. April 29, 1937. 513,867.

MANUFACTURE OF ACETALS.—E. I. du Pont de Nemours and Co. April 21, 1937. 514,056.

BITUMINOUS COMPOSITIONS.—Standard Oil Development Co. Aug. 10, 1937. 513,944.

MACHINE FOR BEATING, squeezing, kneading, or briquetting plastic masses or fibrous materials.—I. G. Farbenindustrie. April 23, 1937. 513,871.

REACTION OF HYDROCARBONS with halogens.—G. W. Johnson (I. G. Farbenindustrie). April 22, 1938. 513,947.

PROCESS FOR THE MANUFACTURE of water-soluble urea-formaldehyde-polyhydric alcohol condensation products.—Beck, Koller and Co. (England), Ltd., (Beck, Koller and Co., Inc., T. S. Hodgins, and A. G. Hovey). April 22, 1938. 514,058.

MANUFACTURE OF WATER-SOLUBLE cellulose ethers.—W. W. Groves (Kalle and Co. A.-G.). April 23, 1938. 513,996.

PRODUCTION OF CHLOROPHYLL.—British Chlorophyll Co., Ltd. and B. A. Rewald. April 23, 1938. 514,061.

DYEING.—I. G. Farbenindustrie. April 27, 1937. 514,069.

OPAQUE VITREOUS ENAMELS.—Soc. de Produits Chimiques des Terres Rares and M. Paquet. May 5, 1938. 513,928.

TREATMENT OF HYDROCARBON OIL.—A. H. Stevens (Phillips Petroleum Co.). Sept. 27, 1938. 513,934.

CARBIDE SUBSTANCES.—P. M. McKenna. Dec. 13, 1937. 514,033.

HARD COMPOSITIONS containing metallic carbides.—P. M. McKenna. Dec. 13, 1937. 514,034.

METHODS OF PREPARING HARD COMPOSITIONS of matter containing metallic carbides.—P. M. McKenna. Dec. 13, 1937. 514,035.

CONCENTRATING BARITE from its ores.—Phosphate Recovery Corporation. Jan. 15, 1938. 514,077.

MANUFACTURE OF REINFORCED ASBESTOS CEMENT BOARDS or the like.—G. J. Arentsen. Jan. 27, 1938. 514,078.

PRODUCING INTERPOLYMERISATION PRODUCTS of tertiary and secondary olefines.—N. V. de Bataafsche Petroleum Maatschappij. March 26, 1937. 514,081.

# Weekly Prices of British Chemical Products

THE market for general chemicals has followed a very steady course during the past week, there being no outstanding movements to record in any direction. Quite a good interest has been maintained for most of the heavy chemicals and deliveries against contracts cover good volumes. A fair amount of inquiry has been circulating for acetic, tartaric and oxalic acids, but available supplies of the latter item are very limited. So far as the price position is concerned there are no important changes to report and quotations for most of the general chemicals, rubber chemicals and wood distillation products are steady with a firm undertone. An active trade has been put through for most of the coal tar products, and values generally are steady to firm.

MANCHESTER.—Fairly active trading conditions are reported on the Manchester chemical market. Traders during the past week have secured a moderate number of orders for early delivery of a wide range of products and there is a steady flow of delivery specifications against contracts, with cotton and woollen textile chemicals a busier section. There is a general belief that prices of the leading soda products will be substantially advanced at the end of the year. With regard to the by-products interest in pitch on export account appears to be growing, but quieter conditions have been reported in certain other tar products.

GLASGOW.—A considerable volume of business is still being dealt with in the Scottish heavy chemical market at prices which show no tendency to weaken. Glucose prices have firmed up since the control was removed. A severe shortage of potassium compounds, oxalic, citric, and tartaric acids is being experienced, but red lead and litharge are reduced 10s. per ton.

### Price Changes

**Rises:** Calcium Bisulphite, Chrometan, Chromic Oxide, Citric Acid (Manchester), Creosote, Dichloraniline, Dinitrobenzene, Dinitrotoluene, Naphthalene, Nitronaphthalene, *o*-Toluidine, *p*-Toluidine, Wood Naphtha, Miscible (solvent), *m*-Xylidine Acetate.

**Falls:** Carbolic Acid, Formaldehyde, Naphtha, Pitch, Sodium Phosphate (tri-sodium), Toluol 90%, Xylol, pure.

*In the case of certain products, here marked with an asterisk, the market is nominal, and the last ascertainable prices have been included.

†Benzol prices remain nominal, owing to doubts concerning the control position.

## General Chemicals

ACETIC ACID.—Maximum prices per ton: 40% technical, 1 ton or over, £15 12s.; 10 cwt. and less than 1 ton, £16 12s.; 4 cwt. and less than 10 cwt., £17 12s.; 80% technical, 1 ton, £29 5s.; 10 cwt./1 ton, £30 5s.; 4/10 cwt., £31 5s.; 80% pure, 1 ton, £31 5s.; 10 cwt./1 ton, £32 5s.; 4/10 cwt., £33 5s.; commercial glacial, 1 ton, £37; 10 cwt./1 ton £38; 4/10 cwt., £29; delivered buyers' premises in returnable barrels.

ACETONE.—Maximum prices per ton, 50 tons and over, £39; 10/50 tons, £39 10s.; 5/10 tons, £40; 1/5 tons, £40 10s.; single drums, £41 10s., delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

*ALUM.—Loose lump, £8 7s. 6d. per ton d/d.

*ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs.

AMMONIA, ANHYDROUS.—99.95%, 1s. to 2s. per lb. according to quantity in loaned cylinders, carriage paid; less for important contracts.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising £21 per ton, in casks, ex wharf. See also Salammoniac.

AMMONIUM DICHROMATE.—1s. per lb. d/d U.K.

*ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Prices nominal, f.o.b. Antwerp, subject to works acceptance.

BARIUM CHLORIDE.—Market nominal.

BLEACHING POWDER.—Spot, 35/37% £9 5s. per ton in casks, special terms for contract.

BORAX COMMERCIAL.—Granulated, £18 per ton; crystal, £19; powdered, £19 10s.; extra finely powdered, £20 10s.; B.P. crystals, £27; powdered, £27 10s.; extra fine, £28 10s. per ton, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £60; powder, £61; in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

BORIC ACID.—Commercial granulated, £32 per ton; crystal, £33; powdered, £34; extra finely powdered, £36; large flakes, £44 10s.; B.P. crystals, £41; powdered, £42; extra fine powdered, £44 per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain.

CALCIUM BISULPHITE.—£7 10s. per ton f.o.r. London.

*CALCIUM CHLORIDE.—GLASGOW: 70/75% solid, £5 12s. 6d. per ton ex store.

CHARCOAL LUMP.—£7 5s. to £11 per ton, ex wharf. Granulated £7 to £9 per ton according to grade and locality.

*CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 3⅜d. per lb.; liquor, £19 10s. per ton d/d station in drums.

CHROMIC ACID.—10¾d. per lb., less 2½%: d/d U.K.

CHROMIC OXIDE.—1s. 1d. per lb., d/d U.K.

CITRIC ACID.—1s. 1d. per lb. MANCHESTER: 1s. 2½d.

COPPER SULPHATE.—MANCHESTER: £25 per ton f.o.b.

CREAM OF TARTAR.—100%, £5 2s. to £5 7s. per cwt., less 2½%.

FORMALDEHYDE.—40% by volume, £22 to £23 per ton, according to quantity, in casks, ex store.

FORMIC ACID.—85%, £42 per ton for ton lots, ex store, in cylinders; smaller parcels quoted at 45s. 6d. to 47s. 6d. per cwt., ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HEXAMINE.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7d. per lb.; carriage paid for bulk lots.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 11s. 2d. per lb. in 7 lb. lots.

*LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £48 to £50, ton lots.

LEAD NITRATE.—About £40 per ton in casks.

LEAD, RED.—English, 5/10 cwt., £34 10s.; 10 cwt. to 1 ton, £34 5s.; 1/2 tons, £34; 2/5 tons, £33 10s.; 5/20 tons, £33; 20/100 tons, £32 10s.; over 100 tons, £32 per ton, less 2½ per cent. carriage paid; non-setting red lead, 10s. per ton dearer in each case; Continental material, £1 per ton cheaper.

LEAD, WHITE.—Dry English, less than 5 tons, £44 10s.; 5/15 tons, £40 10s.; 15/25 tons, £40; 25/50 tons, £39 10s.; 50/200 tons, £39 per ton, less 5% carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £52 10s.; 5/10 cwt., £51 10s.; 10 cwt. to 1 ton, £51; 1/2 tons, £49 10s.; 2/5 tons, £48 10s.; 5/10 tons, £46 10s.; 10/15 tons, £45 10s.; 15/25 tons, £45; 25/50 tons, £44 10s.; 50/100 tons, £44 per ton, less 5% carriage paid. Continental material £2 per ton cheaper.

LITHARGE.—10 cwt.-1 ton, £34 15s. per ton.

MAGNESITE.—Calcined, in bags, ex works, about £9 to £10 per ton.

MAGNESIUM CHLORIDE.—Solid (ex wharf), £10 per ton.

*MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY PRODUCTS.—Controlled prices for 1 cwt. quantities: Bichloride powder, 6s. 4d.; bichloride (industrial users), 6s. 4d.; bichloride lump, 6s. 11d.; bichloride ammon. powder, 7s. 10d.; bichloride ammon. lump, 7s. 8d.; mercurous chloride, 7s. 8d. mercury oxide, red cryst., B.P., 9s.; red levig. B.P., 8s. 6d.; yellow levig. B.P., 8s. 4d.

*METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities.

*NITRIC ACID.—Spot, £25 to £30 per ton, according to strength, quantity and destination.

OXALIC ACID.—£48 5s. per ton for ton lots, ex wharf, in casks, smaller parcels, 53s. to 57s. per cwt., ex store; deliveries slow.

*PARAFFIN WAX.—GLASGOW: 3¾d. per lb.

*POTASH, CAUSTIC.—Market nominal.

POTASSIUM CHLORATE.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

*POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. GLASGOW: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P., 9s. 10¾d. per lb. in 7 lb. lots; for not less than 1 cwt., 7s. 9d. per lb.

POTASSIUM NITRATE.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.

POTASSIUM PERMANGANATE.—Commercial, about 10¾d. per lb., delivered.

POTASSIUM PRUSSIATE.—Yellow, market nominal, supplies scarce.

SALAMMONIAC.—Dog-tooth crystals, £40 per ton; medium, £39; fine white crystals, £20; in casks, ex store.

SALT CAKE.—Unground, spot, £3 15s. per ton.
SODA ASH.—Light 98/100%, £5 17s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, £13 10s. per ton d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£25 to £26 per ton, ex wharf.
SODIUM BICARBONATE.—About £10 10s. per ton, in bags.
SODIUM BISULPHITE POWDER.—60/62%. £12 10s. to £14 per ton d/d in 2-ton lots for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton, d/d according to quantity.
*SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts. GLASGOW: 4½d. per lb., carriage paid.
SODIUM HYPOSULPHITE.—Pea crystals, £15 15s. per ton for 2-ton lots; commercial, £11 15s. per ton. MANCHESTER: Commercial, £11 10s.; photographic, £16.
*SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 5s. per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £16 to £17 per ton delivered for ton lots. Tri-sodium, £18 per ton delivered per ton lots.
SODIUM PRUSSIATE.—4½d. to 5½d. per lb.
SODIUM SILICATE.—£8 2s. 6d. per ton.
*SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
*SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. MANCHESTER: £3 15s.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £13; commercial, £9 10s.
*SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
*SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 2d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 3½d. per lb.
ZINC OXIDE.—Maximum prices: White seal, £23 10s. per ton; red seal, £21 d/d; green seal, £22 10s. d/d buyers' premises.
*ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2-cwt. bags.

## Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 9d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 7½d. to 1s. 9½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.
CARBON DISULPHIDE.—£25 to £30 per ton, according to quantity, in free returnable drums.
CARBON TETRACHLORIDE.—£48 to £53 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 1s. 3d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 5¾d. to 6¾d. per lb.; dark 5½d. to 6d. per lb.
LITHOPONE.—30%, £16 15s. per ton.
SULPHUR CHLORIDE.—6d. to 8d. per lb., according to quantity.
VEGETABLE BLACK.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.
ZINC SULPHIDE.—£56 per ton ex works.

Plus 5% War Charge.

## Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1940; September, £7 5s.; October, £7 6s. 6d.; November, £7 8s.; December, £7 9s. 6d.; January, 1940; £7 11s., February £7 12s. 6d.; March/June, £7 14s.
CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1940; September £8 2s. 6d.; October £8 3s. 9d.; November £8 5s.; December, £8 6s. 3d.; January, 1940, £8 7s. 6d.; February £8 8s. 9d.; March £8 10s.; April/June, £8 11s. 3d.
NITRO-CHALK.—£7 10s. 6d. per ton up to June 30, 1940.
SODIUM NITRATE.—£8 5s. per ton for delivery up to June 30, 1940.
CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

## Coal Tar Products

†BENZOL.—At works, crude, about 1s. 0¾d. per gal.; 90's, 1s. 9d. to 1s. 11d.; pure, 1s. 10d. to 2s. MANCHESTER: Crude, 1s. 0½d. to 1s. 1d. per gal.; pure, 1s. 10½d. per gal.
CARBOLIC ACID.—Crystals, 8½d. to 9d. per lb.; Crude, 60's, 2s. 6d. to 2s. 9d. according to specification. MANCHESTER: Crystals, 8½d. to 9d. per lb., d/d; crude, 2s. 9d. to 3s. naked, at works.
CREOSOTE.—Home trade, 5½d. per gal., f.o.r., makers' works; exports 6d. to 6¼d. per gal., according to grade. MANCHESTER: 4d. to 5¾d.
CRESYLIC ACID.—99/100%, 2s. 9d. to 3s. 3d. per gal., according to specification. MANCHESTER: Pale, 99/100%, 2s. 10d.
NAPHTHA.—Solvent, 90/160°, 1s. 7d. to 1s. 8d. per gal.; solvent, 95/160°, 1s. 10d. to 1s. 11d., naked at works; heavy, 90/190°, 1s. 2½d. to 1s. 4d. per gal., naked at works, according to quantity. MANCHESTER: 90/160°, 1s. 6d. to 1s. 8d. per gal.
NAPHTHALENE.—Crude, whizzed or hot pressed, £8 15s. to £10 15s. per ton; purified crystals, £15 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. MANCHESTER: Refined, £18.
PITCH.—Medium, soft, 32s. 6d. per ton, f.o.b. MANCHESTER: 35s. f.o.b. East Coast.
PYRIDINE.—90/140°, 17s. to 18s. 6d. per gal.; 90/160°, 14s. to 15s.; 90/180°, 3s. to 4s. 6d. per gal., f.o.b. MANCHESTER: 14s. to 17s. 6d. per gal.
TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 7d., nominal. MANCHESTER: Pure, 2s. 7d. per gal., naked.
XYLOL.—Commercial, 2s. 4d. per gal.; pure, 2s. 6d. MANCHESTER: 2s. 6d. per gal.

## Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 5s. to £8 per ton; grey, £10 to £12. MANCHESTER: Grey, £14.
METHYL ACETONE.—40.50%, £35 to £38 per ton.
WOOD CREOSOTE.—Unrefined, 1s. to 1s. 3d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—3s. 7d. to 4s. per gal.; solvent, 4s. to 4s. 6d. per gal.
WOOD TAR.—£4 to £5 per ton, according to quality.

## Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—1s. 10d. per lb., for cwt. lots, net packages.
BENZIDINE, HCl.—2s. 7d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d buyer's works.
*m*-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
*o*-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
*p*-CRESOL 34/35° C.— 1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 7d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 11½d.
DIPHENYLAMINE.—Spot, 2s. 3d. per lb.; d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb. 100%, d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100%, d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%
*o*-NITRANILINE.—4s. 3½d. per lb.
*m*-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
*p*-NITRANILINE.—Spot, 1s. 10d. to 2s. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.
*o*-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.
*p*-TOLUIDINE.—2s. per lb., in casks.
*m*-XYLIDINE ACETATE.—4s. 5d. per lb., 100%.

## Latest Oil Prices

LONDON.—Nov. 22.—To November 25 (per ton, net, naked, ex mill, works, or refinery, and subject to additional charges as to package and location of supplies):—LINSEED OIL, raw, £36. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £26; washed, £28 15s.; refined edible, £29 12s. 6d.; refined deodorised, £30 10s. SOYA BEAN OIL, crude, £27; refined, deodorised, £31. GROUNDNUT OIL, crude, £29 10s.; refined deodorised, £34. COCONUT OIL, crude, £22 2s. 6d.; refined deodorised, £25 7s. 6d. PALM OIL, refined deodorised, £27. PALM KERNEL OIL, crude, £21 10s.; refined deodorised, £24 15s. WHALE OIL, crude hardened 42 deg., £24 10s.; refined hardened 42 deg., £27. ACID OILS.—Groundnut oil, £16; soya bean oil, £15; coconut and palm kernel oils, £18 10s. Demand was quiet for non-controlled commodities. ROSIN was unaltered at from 25s. to 35s. per cwt., according to grade. TURPENTINE was again 6d. lower at 60s. 6d. per cwt., spot. American, including tax, ex wharf, barrels and ex discount.

# Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

## Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

DR. LISTER'S LABORATORIES, LTD., London, W. (M., 25/11/39.) Nov. 8. £1,000 debenture to Annie Phelps, Ltd.; general charge.

HAYES AND FINCH, LTD., Liverpool, dealers in beeswax, etc. (M., 25/11/39.) Nov. 13, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land adjoining 32 to 38 (even) Vernon Street, Liverpool, etc. £3,138. Jan. 11, 1939.

OLIVER PRAGNELL AND CO., LTD., Bristol, colour, paint, etc., manufacturers. (M., 25/11/39.) Nov. 11, £6,000 mortgage to M. O. Pragnell, Bristol, and others; charged on 25, 26, and 27 Broadmead, and land and buildings at Albert Road, St. Philips (formerly the Cooperage), with land at rear thereof, all Bristol. *Nil. Feb. 17, 1939.

SOUTH WALES MAGNESIA, LTD., London, W.C., dealers in minerals, etc. (M., 25/11/39.) Nov. 8, £2,500 debentures; general charge.

### Satisfactions

LONG MEG PLASTER AND MINERAL CO., LTD., London, S.W. (M.S., 25/11/39.) Satisfaction Nov. 14, of debenture reg. Jan. 24, 1938.

## County Court Judgments

IRWELL MERCERISING AND DYEING CO., LTD., R/O. Irwell Bleach and Dye Works, Radcliffe, bleachers and dyers. (C.C., 25/11/39.) £20 19s. 10d. Oct. 13.

STRAFSON AND CO., LTD., 252 Barking Road, Plaistow, oil and colour merchants. (C.C., 25/11/39.) £21 1s. 7d. Oct. 11.

ZEMS, LTD., reg. office, 48 Cannon Street, E.C.4, manufacturing chemists. (C.C., 25/11/39.) £20 8s. 1d. Oct. 16.

## Companies Winding-Up Voluntarily

WESTCLIFFE PLASTER AND CONCRETE CO., LIMITED. (C.W.U.V., 11/11/39.) Thomas Roberts of North House, North John Street, Liverpool, appointed liquidator.

THE PATRINGTON GAS CO., LTD. (C.W.U.V., 11/11/39.) General meeting of members at the offices of the Liquidator, Imperial Chambers, Bowlalley Lane, Hull, on December 4, 1939, at 11 p.m. E. M. Hogarth, liquidator.

THE SINGLE ROSE CLAY COMPANY, LIMITED. (C.W.U.V. 11/11/39.) General Meeting of members at 4 Tregarne Terrace, St. Austell, Cornwall, Tuesday, December 5, 12 noon. J. W. Shaffery, liquidator.

# Company News

**T. Lucas and Co., Ltd.,** chemical manufacturers, etc., Ruskitt Mills, Kingswood, Bristol, have increased their nominal capital by the addition of £5,000, in £1 shares, beyond the registered capital of £5,000.

**Anglo-Continental Guano Works, Ltd.,** controlled by Fison, Packard and Prentice, report total profits for the year to June 30 last of £86,034, compared with £90,948 in 1937-38. The dividend on the ordinary shares is being maintained at 10 per cent., less tax, and the balance forward is raised from £17,890 to £18,879.

# New Companies Registered

**Croftbank Chemical Company, Ltd.** (357,363).—Private company. Capital, £600 in £1 shares. To carry on the business of chemists, chemical manufacturers, drysalters, etc. Directors: Allan C. Hanson, Park Mount, Queens Road, Oldham; Richard Hoggins; Harry Needham; Geoffrey C. Wood.

**British Luminous Industries, Ltd.** (357,543).—Private company. Capital £100 in 2,000 shares of 1s. each. Objects: To carry on the business of manufacturers of paints, colours, varnishes, enamels, powders, etc. Subscribers: Eugene L. Wall, Albert E. Bonner. Solicitor: M. L. Spector, 7-8 Great Winchester Street, E.C.2. Registered office: Harrow Weald Vicarage, Harrow Weald, Middlesex.

**Patent Borax Company, Ltd.** (357,603).—Private company. Capital, £5,000 in 5,000 shares of £1 each. To acquire the business of borax and soap manufacturers now or formerly carried on by the Patent Borax Company, Ltd. (incorporated 1893), and to enter into an agreement with the liquidators of the said company, and Henry Fiddian and Joseph Foulkes. Directors: Henry Fiddian, Joseph Foulkes. Solicitors: Eversheds & Tomkinson, Lombard House, Gt. Charles Street, Birmingham, 3. Registered office: 196 Ledsam Street, Ladywood, Birmingham, 16.

# Chemical and Allied Stocks and Shares

CHIEF interest in the stock and share markets has naturally attached to the announcements in regard to the initial steps of the Government's war financing plans. Consequently, activity in industrial and other securities has been reduced, and share values have tended to slightly lower levels. This was attributed to reduced demand and not to selling pressure, which was, in fact, again very moderate. The prevailing market view is that at current levels the majority of industrial shares more than discount increased taxation, higher costs and the other factors arising from the war.

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Imperial Chemical at 30s. 4½d. were within 6d. of the price current a week ago, while the preference units at 31s. were unchanged on balance. B. Laporte were inactive, and although "ex" the interim dividend, were again quoted at 57s. 6d. Fison, Packard at 36s. 9d. were slightly lower, but Swedish Match improved from 15s. 9d. to 16s. 6d. and British Match were again 32s. 9d. Monsanto Chemicals 5½ per cent. preference shares continued to be quoted at 21s. 3d. Lever and Unilever were better at 30s. 9d.

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Shares of companies connected with the plastics and kindred trades were slightly more active. British Industrial Plastics held their recent improvement to 2s. 1¼d., while Erinoid were better at 2s. 10½d., and a few dealings took place in Lacrinoid Products and Catalin shares. Reports are current that work of national importance is leading to more active conditions in the plastics industry. Elsewhere British Celanese made the higher price of 7s. aided by the elimination of all outstanding arrears of dividend on the first preference shares. This was not generally expected at this stage and has naturally increased the belief that the impending financial results will show a good improvement in earnings. Moreover there are now hopes that a scheme to fund the large arrears of second preference dividend may be announced shortly, and thus pave the way for an initial distribution on the ordinary shares. Courtaulds, Lansil, North British Rayon and most rayon shares have made better prices on balance. Other textile shares also attracted rather more attention and slightly better prices ruled for Bradford Dyers, Bleachers, and British Cotton and Wool Dyers.

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Among paint shares Lewis Berger were lower at 41s. 3d. following the deduction of the dividend, but International Paint kept at 75s. and Pinchin Johnson were unchanged at 20s. 6d. Wall Paper deferred units were lowered to 17s. 6d. United Molasses at 25s. were slightly higher, pending declaration of the final dividend. Imperial Smelting were 3d. down at 10s. 9d. Boots Drug fluctuated around 40s. 9d. while Beechams Pills deferred were higher at 8s. 3d. awaiting the interim dividend, due to be declared next month. Sangers, whose interim is also impending, were 20s. 6d. and Timothy Whites transferred around 21s. 9d. Distillers moved up from 65s. 3d. to 66s. 9d. and both Barry and Staines and Michael Nairn were steady features, as were Reckitt and Sons and Cerebos, but prices were not tested by much business this week.

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Among iron and steel securities Dorman Long were firmer at 26s. on further consideration of the results, while Whitehead Iron improved on satisfaction with the interim dividend. Stewarts and Lloyds were better at 42s. 3d., and awaiting the full results and annual meeting. Tube Investments had a firm appearance at 84s. Oil shares fluctuated. "Shell" were 82s. 6d., compared with 84s. 4½d. a week ago, and Burmah Oil went back from 63s. 9d. to 62s. 6d. On the other hand, Lobitos Oilfields have risen from 36s. 3d. to 40s. 7½d. and Anglo-Iranian at 61s. 3d. were the same as a week ago.